

In the Drawings:

The attached sheet of drawings includes changes to Fig. 1. This sheet, replaces the original sheet including Fig. 1.

A "Prior Art" legend has been added to the identification of Fig. 1.

An annotated sheet showing changes to drawing Fig. 1 is attached hereto for the Examiner's convenience.

ATTACHMENTS: Replacement Sheet
Annotated Sheet Showing Changes

REMARKS

Claims 1-32 are pending. Claims 20, 23 and 30 have been amended. Applicants respectfully request reconsideration of this application in light of the claim amendments and the following remarks.

Amended Figure 1

Fig. 1 was objected to for not including a "Prior Art" legend. Clean and marked-up copies of Amended Fig. 1 are included with this Amendment.

Rejections Under 35 U.S.C. § 112

Claims 20-21 and 23-32 were rejected under § 112 as being indefinite for failing to distinctly claim the subject matter which Applicants regard as the invention. Independent claims 20, 23 and 30 have been amended to clarify the subject matter of the claimed invention, and these amendments are fully supported by the application as originally filed. Applicants respectfully request withdrawal of this rejection.

Rejections Under 35 U.S.C. § 102(b)

Claims 1-3, 11, 13-22 and 30 were rejected under § 102(b) as being anticipated by U.S. Patent No. 5,846,442 to Pasco ("Pasco"). Applicants respectfully submit that Pasco does not anticipate the rejected claims because, contrary to the assertions in the Office Action, Pasco does not report or suggest applying a patterned photoresist mask to a substrate to control a contour at a transition area of the substrate.

Pasco reports a partial etching process resulting in at least two areas of a substrate having measurable differences in thickness. (Abstract; Col 3, line 63 - Col 4, line 2). This process is illustrated in Figs. 1A-1D of Pasco. Referring to Fig. 1D of Pasco, the resulting substrate shows two discrete areas, identified as 24 and 26, having different partial-etch depths. Positioned between these two distinct areas 24 and 26 is an area of the substrate that remains comparatively non-etched.

Claims 1, 13 and 22 of the present invention recite a partial-etching method in which the contour of a *transition area* is controlled by the application of a mask pattern having specifically

controlled mask openings and land mask areas. Embodiments of the invention illustrated in Figs. 2A-2E have a transition area on a substrate patterned to control the contour at corners 42. Pasco, in contrast, does not report the control of the contour of a transition area, for example the transition area between areas 24 and 26, but instead applies discrete mask patterns to form areas 24 and 26.

Claim 20 recites a process for etching a thin substrate by etching a masked substrate having open areas and resist land areas sized and spaced to reduce the relative etch rate at the transition area. For the reasons asserted above with respect to claims 1, 13 and 22, Pasco does not report a method in which the relative etch rate at the *transition area* is reduced.

Claims 23-29 were also rejected under § 102(b) as being anticipated by U.S. Patent No. 5,421,934 to Misaka ("Misaka"). Applicants respectfully submit that Misaka does not anticipate the claimed invention because Misaka does not report forming a resist mask having a plurality of openings and land areas to incrementally increase the etch rate across a substrate, nor does it report or suggest forming a tapered substrate in this manner.

Misaka generally reports a surface reaction model, which treats the etching rate of a dry plasma etchant as a function of the coverage ratio by absorbed radicals on the surface of the substrate. Fig. 9a of Misaka cited in the Office Action shows an example of a "transport-limited" situation where the quantity of radicals supplied to the surface of the substrate through the mask is smaller than the reaction quantity of the substrate surface. Under this modeled condition, etch depth exceeds etch width.

Applicants respectfully submit that Fig. 9a of Misaka and its supporting description do not report a process similar to the invention recited in claims 23-29. Most notably, Misaka does not report using the disclosed etching model to form a tapered substrate as claimed. Additionally, Fig. 9a shows a resist mask having only a single mask opening, rather than a plurality of mask openings and mask land areas as claimed. Furthermore, Fig. 9a does not illustrate or suggest the application of a mask pattern to provide incremental changes in etch depth across a substrate to form the substrate. Instead, Misaka only reports that a change in the dimension of the single mask opening shown in Fig. 9a changes the etch rate in the depth direction according to reported model. Applicants respectfully request withdrawal of this rejection.

Rejections Under 35 U.S.C. § 103(a)

Claims 4-10, 12 and 31-32 were rejected as being unpatentable over Pasco in view of U.S. Patent No. 5,935,451 to Dautartas et al. ("Dautartas"). Applicants respectfully submit that this rejection is improper because neither Pasco nor Dautartas report control of a contour in a transition region by applying a pattern of mask openings and mask land areas as claimed.

The remarks made above in reference to Pasco are reiterated for the present rejection. Likewise, Dautartas does not report the use of a plurality of mask openings and land mask areas to control the contour of a transition area of a substrate during a partial etching process. The Office Action asserted that Dautartas teaches an average distance between mask land areas of 10 micrometers, and that it would be obvious to modify Pasco to use land areas of this size. Applicants respectfully submit that Dautartas reports that the distance between the two mask openings, not the mask areas, is 10 micrometers (col. 2, lines 58-61). Dautartas further reports that the mask openings have a major dimension well above 100 microns. Applicants respectfully request withdrawal of this rejection.

CONCLUSION


All of the pending claims are in condition for allowance, and applicants respectfully request a notice to that affect. If there are any remaining questions, the Examiner is requested to contact the undersigned.

Respectfully Submitted,

CATHERINE A. MORLEY et al.

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By:


John L. Crimmins, #51,589
FAEGRE & BENSON LLP
2200 Wells Fargo Center
90 South Seventh Street
Minneapolis, MN 55402-3901
612/766-7749

M2:20734999.01



Applicant: Catherine A. Morley et al.
App. No.: 10/662,934
For: Process for Control of Contours Formed by Etching Substrates
Docket No.: 17310-293333
Attorney: Paul W. Busse, Reg. No. 32,403
Annotated Replacement Sheet Sheet 1 of 1

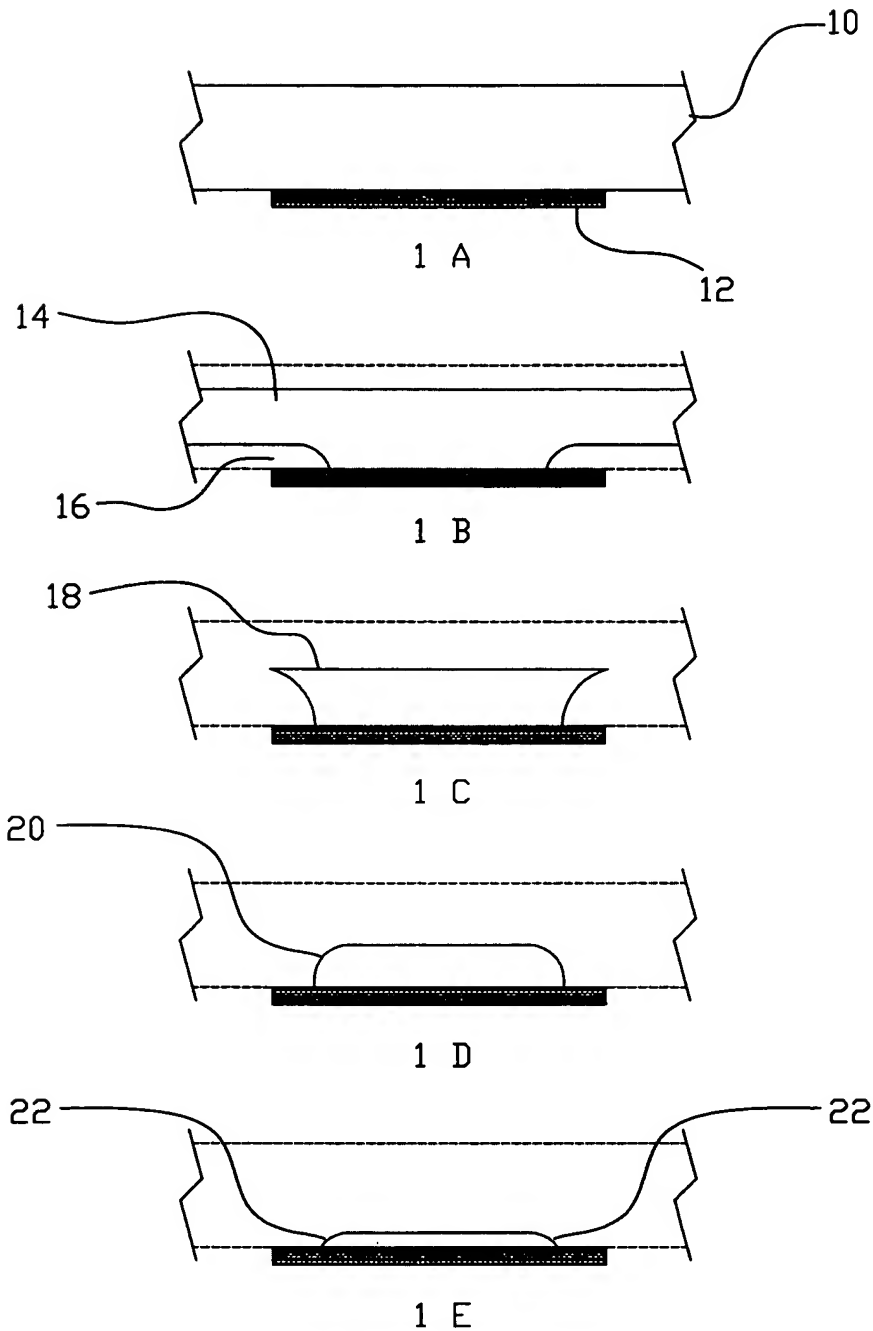


FIGURE 1
PRIOR ART